



# Forest Health and Exotic Vegetation

## Introduction

Approximately 23% of known plant species in Shenandoah National Park are exotic. Invasive exotics pose real threats to the existence of native plants and animals by squeezing them out and destroying their habitats. Biological diversity is decreased and ecosystems are harmed by changing the species make-up, stand structure, and species interactions. Exotics do this by their dominating biological features. Controlling exotic plants, therefore, is an essential part of preserving and protecting our nation's heritage for future generations.

## Biological Advantages of Exotics

Infestation of mile-a-minute vine at Milepost 14 along Skyline Drive, Shenandoah National Park.

Invasive exotics have biological characteristics that allow them to rapidly invade and out-compete others for moisture, light, and nutrients. They do this through one or more of the following traits:

- High rates of photosynthesis
- Able to withstand high microsite temperatures
- Rapid early growth and maturity (overshadowing others)
- Prolific reproductive capacity (rapid plant maturation; great seed producers, rapid vegetative spread rates)
- Highly successful seed germination, seed dispersal, and colonization
- Long-lived seeds or reproductive structures in the soil

- Roots or rhizomes with large food reserve that resist site impacts such as browsing, fire, insects, drought, etc.
- Production of biological toxins that inhibit the growth of other plants
- Ability to climb over other plants, natural features, or structures, and
- Relatively free of natural controls.



## Management Approach

Park employee spraying herbicide on leaves of Japanese knotweed and tree of heaven at Thornton Gap.



Early detection and rapid response is essential to minimize the effort needed to control troublesome exotics. Public education is of great value in informing people about specific exotic plants, describing ways the public can help stop future invasions, and demonstrating effective control methodologies. Shenandoah National Park uses an array of control tools to treat specific exotic plants. Cutting or uprooting is used on several annual and biennial plants and in the early stages of perennial plant invasions. Prescribed fire is used in the case of

Oriental bittersweet to stress or kill the plant and physically open up areas to make follow-up treatments of new seedlings possible. Herbicides are used in cases where resprouting is likely or where the magnitude of treatment is beyond what can be reasonably tackled before the exotic expands. Reliance on chemicals is discouraged in favor of taking an integrated approach. Exotic plant control methodologies being used within Shenandoah National Park include the following:

- Manual: hand pulling, uprooting, hand cutting, and hand sawing
- Mechanical: motorized weed-whacking, chainsaws, and pole pruners
- Chemical: applying herbicides to leaves or stems/trunks or cut stumps

- Silvicultural: planing native plants (grasses to date) to avoid exotics' re-invasion
- Prescribed Fire: using ground fire or stand replacement fire to reduce

invasive plant density, stress exotic plants or reduce presence of vines to make access possible.

## What We've Learned

Russian Volunteer lopping bittersweet vine near Headquarters. Several exotics may be treated manually, either cut, mowed, or burned.

Shenandoah National Park is completing its initial exotic plant survey. Field work has focused on areas of past and present site disturbance – areas that exotic plants readily take advantage of for colonization and domination. To date, we have surveyed the forests and fields along the length of Skyline Drive and its associated developments, adjacent to fire control access roads, wildfire impacted areas, the Park boundary, and (in progress) historical homesites within the Park. With the data and preliminary analysis, we are able to describe our greatest resource threats, quantify specific exotic plant presence and dominance and measure their expansion into non-infested areas. The information is essential to plan for future exotic eradication and control efforts. Though the analysis is not yet complete, a brief summary of findings includes the following.

### Shenandoah National Park Exotic Survey Summary (to date)

- Exotic plant infested plots
  - Skyline Drive and fire roads : 47%
  - Park boundary: ~>60%
- The five most common exotic species detected within the forb layer of plots
  - Skyline Drive and fire roads: garlic mustard, dandelion, plantain, orchard grass, and chickweed
  - Park boundary: garlic mustard, Asian waterpepper, Japanese stiltgrass, burdock, and Asiatic Dayflower

- The five species with greatest site dominance when present

- Skyline Drive and fire roads: Japanese stiltgrass, Japanese knotweed, tall fescue, garlic mustard, and coltsfoot

- Park boundary: periwinkle, Japanese stiltgrass, Asian waterpepper, garlic mustard, and burdock

- Species with greatest penetration into otherwise undisturbed forest settings

- Skyline Drive and fire roads: garlic mustard, Japanese

- Park boundary: garlic mustard, Asiatic waterpepper, and Japanese stiltgrass

- Areas of greatest exotic plant presence along the Park boundary

- west side (of east side / west side) and north district (of north/central/south districts).



## Accomplishments

Shenandoah National Park has been active in eradicating and controlling exotic species since 1998. We have effectively been controlling the following targeted species: kudzu, Oriental bittersweet, mile-a-minute vine, Johnson grass, Japanese stiltgrass, Japanese knotweed, multiflora rose, Japanese barberry, autumn olive, bamboo, tree of heaven, and princess tree, among others.

The following chart outlines our control activity and accomplishments to date.

